

Claims

1. A coupling device including first and second rotatable bodies, a plurality of engagement members for selectively coupling the first and second rotatable bodies together to transfer drive between the rotatable bodies, and a guard device for preventing the engagement members from coupling the rotatable bodies in certain predetermined operational conditions that include certain relative rotational positions of the rotatable bodies.
2. A coupling device according to claim 1, wherein the guard device includes at least one guard element for restricting movement of at least one of the engagement members.
3. A coupling device according to claim 2, wherein the or each guard element includes an actuator part arranged to co-operate with either the engagement members or one of the rotatable bodies wherein, in use, the engagement members couple the rotational bodies after the actuator part co-operates with either the engagement members or one of the rotatable bodies.
4. A coupling device according to claims 2 or 3, wherein the or each guard element includes a guard part arranged to co-operate with either the engagement members or one of the rotatable bodies, wherein, in use, the engagement members are restricted from coupling the rotatable bodies after the guard part co-operates with either the engagement members or one of rotatable bodies.
5. A coupling device according to any one of claims 2 to 4, wherein the or each guard element is arranged to cause separation between at least one engagement member and one of the rotatable bodies.
6. A coupling device according to claim 5, wherein the or each guard element is arranged to cause the separation according to the relative rotational positions of the engagement members and at least one of the rotational bodies.
7. A coupling device according to any one of claims 2 to 6, wherein each of the engagement members includes a guard element mounted thereon.

8. A coupling device according to claim 7, wherein each guard element is pivotally mounted on the engagement member.
9. A coupling device according to claim 8, wherein each guard element is arranged to move between a first operative position in which it restricts movement of the engagement member and a second operative position in which it does not restrict movement of the engagement member.
10. A coupling device according to claim 9, including resilient means for biasing each guard element into the first operative position.
11. A coupling device according to any one of claims 8 to 10, including a plurality of guard elements wherein pairs of guard elements are arranged to interact such that rotational movement of one of the pair of guard elements causes rotational movement of the other guard element.
12. A coupling device according to any one of claims 8 to 11, wherein at least one of the rotatable bodies includes profiled parts that are complementary to the actuator part of the guard element.
13. A coupling device according to any one of claims 8 to 12, wherein at least one of the rotatable bodies includes profiled parts that are complementary to the guard part of the guard element.
14. A coupling device according to any one of claims 2 to 6, wherein the or each guard element is mounted on an annular member.
15. A coupling device according to claim 14, wherein the or each guard element is substantially trapezoidal.
16. A coupling device according to claim 15, wherein the or each guard element includes a guide part arranged to guide the engagement members over the or each guard element.

17. A coupling device according to any one of claims 14 to 16, including resilient means for resisting relative rotational movement between the annular member and at least one of the rotatable bodies.

18. A coupling device according to any one of claims 2 to 6, wherein the or each guard element is mounted on at least one of the rotatable bodies.

19. A coupling device according to claim 18, wherein the engagement members include profiled parts that are complementary to the or each guard element.

20. A transmission system including first and second drive shafts, first and second gear sets mounted on the shafts for transferring drive between the shafts, each gear set including a first gear wheel mounted on the first shaft for rotation relative to the first shaft said first gear wheel having a plurality of drive formations, and a second gear mounted on the second shaft for rotation with the second shaft, selector means for selectively transferring drive between the first shaft and either the first or second gear set including a plurality of engagement members for engaging the drive formations, and a guard device for preventing the engagement members from engaging the drive formations in certain predetermined operational conditions that include the relative rotational positions of the drive formations and the engagement members.

21. A transmission system according to claim 20, wherein the guard device includes a plurality of guard elements for restricting movement of the engagement members.

22. A transmission system according to claim 21, wherein each guard element includes an actuator part arranged to co-operate with either the engagement members or the drive formations, the guard device being constructed and arranged such that, in use, the engagement members fully engage the drive formations after the actuator part co-operates with either the engagement members or the drive formations.

23. A transmission system according to claims 20 or 21, wherein each guard element includes a guard part arranged to co-operate with either the engagement members or the drive formations, the guard device being constructed and arranged such that, in use, the

engagement members are restricted from engaging the drive formations after the guard part co-operates with either the engagement members or the drive formations.

24. A transmission system according to claim any one of claims 21 to 23, wherein the guard elements are arranged to cause separation between the engagement members and the drive formations.

25. A transmission system according to claim 24, wherein the guard elements are arranged to determine the separation according to the relative rotational positions of the drive formations and the engagement members.

26. A transmission system according to any one of claims 21 to 25, including first and second guard elements associated with each drive formation, wherein the first guard element is arranged to restrict movement of engagement members approaching the drive formation from a first rotational direction and the second guard element is arranged to restrict movement of engagement members approaching the drive formation from a second rotational direction.

27. A transmission system according to any one of claims 21 to 26, wherein each of the engagement members includes a guard element mounted thereon.

28. A transmission system according to claim 27, wherein each guard element is pivotally mounted on the engagement member.

29. A transmission system according to claim 28, wherein each guard element is arranged to move between a first operative position in which it can restrict the movement of the engagement member and a second operative position in which it cannot.

30. A transmission system according to claim 29, including resilient means for biasing each guard element into the first operative position.

31. A transmission system according to any one of claims 28 to 30, wherein pairs of guard elements are arranged to interact such that rotational movement of one of the guard elements in the guard element pair causes rotational movement of the other guard element.
32. A transmission system according to any one of claims 28 to 31, wherein the drive formations include profiled parts that are complementary to the actuator part of the guard element.
33. A transmission system according to any one of claims 28 to 32, wherein the drive formations include profiled parts that are complementary to the guide part of the guard element.
34. A transmission system according to any one of claims 20 to 26, wherein the guard elements are mounted on an annular member.
35. A transmission system according to claim 34, wherein the guard elements are substantially trapezoidal.
36. A transmission system according to claim 34 or 35, wherein each guard element includes a guide part arranged to guide the engagement members over the guard elements.
37. A transmission system according to any one of claims 34 to 36, including resilient means for resisting relative rotational movement between the annular member and the first gear wheel.
38. A transmission system according to any one of claims 20 to 26, wherein the guard elements are mounted on the drive formations.
39. A transmission system according to claim 38, wherein the engagement members include profiled parts that are formed complementary to the guard elements.